

What is claimed is:

1. A system for monitoring conditions at a plurality of computing stations remote from a monitoring station, wherein each computing station includes a primary processor and a chassis housing the primary processor; said system including:

a plurality of detector arrays, each of the arrays located at a different one of a plurality of computing stations, each detector array including at least one detector adapted to sense a condition at the associated computing station and generate a detector signal indicating the sensed condition;

a plurality of controllers, each of the controllers located at an associated one of the computing stations and operatively coupled to the associated detector array to receive the detector signal from each detector of the associated array and generate a condition signal corresponding to each received detector signal;

a plurality of condition information generators, each condition information generator located at an associated one of the computing stations, coupled to receive each associated condition signal, and adapted to generate condition information including a condition information entry based on each received condition signal;

a computing station memory at each computing station adapted to receive the associated condition information, including a first memory sector for storing address information identifying the associated computing station, and a second memory sector for dynamically storing the associated condition information;

wherein each condition information generator further is adapted to present a condition record including the address information and the condition information for retrieval by a monitoring station, in response to receipt of a cue from the monitoring station; and

a monitoring station remote from the computing stations and communicatively coupled to the computing stations, including a monitoring station processor, a selection component for individually selecting different ones of the computing stations, a monitoring component for generating cues and sending the cues to the selected computing stations, and an image generator adapted to generate visible images of the condition records presented in response to the cues and retrieved by the monitoring station.

2. The system of claim 1 wherein:

the monitoring component comprises computer software in the form of a monitoring program resident in the monitoring station processor, adapted to generate and send cues in accordance with selection input from the selection component.

3. The system of claim 2 wherein:

the selection component comprises an operator-controlled device linked to the monitoring station processor and configured to allow a system user to control said selection input.

4. The system of claim 2 wherein:

the monitoring station further includes a memory segment for storing computing station address information comprising a list of addresses identifying the computing stations, and said selection component comprises computer software in the form of a selection program operatively associated with the monitoring program and the first memory segment to select the computing stations from the list of addresses.

5. The system of claim 4 wherein:

the selection program and the monitoring program operate in the background, transparent to a user of the monitoring station processor; and

the monitoring station processor is adapted to generate a warning in response to receipt of a condition record including a fault indication.

6. The system of claim 5 wherein:

the monitoring station further includes a video display terminal coupled to the monitoring station processor for displaying images of condition records, and

the warning includes a visible image at the video display terminal.

7. The system of claim 5 wherein:

the monitoring station processor further is adapted to generate the warning in response to a failure to retrieve a condition record from one of the computing stations pursuant to a predetermined threshold after sending a cue to said one computing station.

8. The system of claim 1 wherein:

each of the detector arrays includes a plurality of detectors for detecting different conditions, and the condition information generated by each condition information generator includes a plurality of condition information entries individually relating to the different conditions.

9. The system of claim 8 further including:

an evaluation component for determining, with respect to each of the condition entries, the presence of a fault.

10. The system of claim 9 wherein:

each of the computing station memories further includes a third memory sector for storing acceptance standards individually associated with the conditions, and the evaluation component includes a comparator coupled to the second and third memory sectors at each computing station for individually comparing the acceptance standards with the condition information entries and generating a fault indication responsive to each failure of a condition information entry to satisfy the associated acceptance standard.

11. The system of claim 10 wherein:

each of the acceptance standards consists essentially of one of the following: a maximum value, a minimum value, and a range of values.

12. The system of claim 10 wherein:

each of the condition information entries consists essentially of one of: a value associated with the detected condition; a fault indication; and a combination of the value and the fault indication.

13. The system of claim 9 wherein:

the monitoring station further includes a first memory segment for storing the condition records presented in response to the cues and retrieved by the monitoring station, and a second memory segment for storing acceptance standards individually associated with detected conditions; and

the evaluation component includes a monitoring station comparator coupled to the first and second memory segments, adapted to individually compare the acceptance standards and the

condition information entries, and to generate a fault indication responsive to each failure of a condition information entry to satisfy the corresponding acceptance standard.

14. The system of claim 13 wherein:

the image generator is operably associated with the comparator and thereby adapted to selectively incorporate in said visible images only the condition information entries that include fault indications.

15. The system of claim 1 wherein:

each of the controllers operates independently of its associated primary processor.

16. The system of claim 1 wherein:

each condition information generator comprises a web engine adapted to present the condition record as a web page at the associated computing station.

17. The system of claim 16 wherein:

each web engine comprises a computer program resident in a data storage environment near the associated controller.

18. The system of claim 1 wherein:

each of the condition information generators comprises a computer program resident in a data storage environment near the associated controller, and the first sector of each computer station memory is resident in said data storage environment.

19. The system of claim 1 wherein:

the selection component, the monitoring component and the image generator comprise computer programs resident in the monitoring station processor, and the monitoring station memory includes a plurality of registers resident in the monitoring station processor.

20. The system of claim 1 wherein:

the selection component comprises a web browser.

21. The system of claim 1 wherein:

the selection component comprises computer software in the form of a selection program resident in the associated monitoring station processor.

22. The system of claim 21 wherein:

the selection program is written in a universal language and normally operates transparently to a user of the monitoring station processor.

23. The system of claim 1 further including:

a set of primary data transmission pathways adapted to accommodate transmission of working data and operating programs between the monitoring station and the computing stations; and

a set of secondary data transmission pathways adapted to accommodate transmission of condition monitoring data including the cues and condition records between the monitoring station and the computing stations.

24. The system of claim 23 wherein:

the primary data transmission pathways include a first carrier frequency bandwidth to accommodate wireless transmissions of working data and operating programs, and the secondary data transmission pathways include a second carrier frequency bandwidth to accommodate wireless transmissions of the condition monitoring data.

25. In a network of computing stations, a monitoring station for tracking conditions at the other computing stations in the network, said monitoring station including:

a monitoring station processor;

a selector for determining a set of remote computing stations to be monitored from a monitoring station that includes the monitoring station processor;

a monitoring component operably associated with the selector and adapted to send cues in a sequence to the selected remote computing stations, thereby to cause each selected computing station to generate a condition record including computing station address information and condition information indicating at least one sensed condition at the computing station, and to present the condition record for retrieval by the monitoring station; said monitoring component being further adapted to retrieve the condition records presented by the computing stations; and

a monitoring station memory including a first memory segment for storing a list of addresses individually identifying the remote computing stations;

wherein the monitoring station processor is adapted to generate a warning in response to receiving a condition record with a fault indication; and

wherein the monitoring component and the selector are configured to operate transparently to a user of the monitoring station processor until said processor generates a warning.

26. The monitoring station of claim 25 further including:

an image generator associated with the monitoring station memory, for generating visible images of the retrieved condition records, and a video display terminal operably coupled to the image generator and adapted to display the visible images, wherein the warning includes a visible image at the video display terminal.

27. The monitoring station of claim 25 wherein:

the monitoring component is adapted to send the cues in multiple repetitions of said sequence, and the monitoring station includes a second memory segment adapted to dynamically store the condition records retrieved by the monitoring component to thereby contain the condition records related to a most current repetition of the sequence.

28. The monitoring station of claim 25 wherein:

the monitoring component comprises computer software in the form of a monitoring program resident in the monitoring station processor, adapted to generate and send the cues in accordance with input from the selection component.

29. The monitoring station of claim 28 wherein:

the selector comprises an operator-controlled device linked to the monitoring station processor and configured to allow a system user to control said input.

30. The system of claim 28 wherein:

the selector comprises computer software in the form of a selection program operably associated with the monitoring program and the first memory segment.

31. The monitoring station of claim 26 wherein:

each of the condition records includes a plurality of condition information entries relating to different conditions sensed at the associated remote computing station, and the monitoring

station incorporates an evaluation component for determining the presence of a fault with respect to each of the condition information entries.

32. The monitoring station of claim 31 wherein:

the monitoring station memory includes a second memory segment for storing retrieved condition records, and a third memory segment for storing acceptance standards individually associated with the detected conditions; and

the evaluation component includes a monitoring station comparator coupled to the second and third memory segments, adapted to individually compare the acceptance standards and the condition information entries, and to generate a fault indication responsive to each failure of a condition information entry to satisfy the corresponding acceptance standard.

33. The monitoring station of claim 32 wherein:

the image generator is operably associated with the comparator and thereby adapted to selectively incorporate in said visible images only the condition information entries that include fault indications.

34. The monitoring station of claim 25 wherein:

each of the condition records retrieved from one of the remote computing stations includes a plurality of condition information entries relating to different conditions at the remote computing station.

35. The monitoring station of claim 25 wherein:

the monitoring station processor further is adapted to generate the warning in response to a failure to retrieve a condition record from one of the computing stations pursuant to a predetermined threshold after sending a cue to said one computing station.

36. The monitoring station of claim 26 wherein:

the selector, the monitoring component and the image generator comprise computer programs resident in the monitoring station processor, and the monitoring station memory includes a plurality of registers resident in the monitoring station processor.

37. The monitoring station of claim 36 wherein:

the selector and the monitoring component are written in a universal language.

38. A self monitoring computing station, including:

a primary processor disposed at a computing station;

a detector array at the computing station, including at least one detector adapted to sense a condition at the computing station and generate a detector signal indicating the sensed condition;

a controller coupled to receive the detector signal from each detector of the array, and adapted to generate a condition signal corresponding to each detector signal;

a condition information generator coupled to receive each condition signal and adapted to generate condition information including a condition information entry based on each received condition signal;

a memory at the computing station including a first memory sector for storing address information identifying the computing station, a second memory sector for dynamically storing the condition information, and a third memory sector for storing an acceptance standard corresponding to each condition information entry; and

a comparator coupled to the second and third memory sectors, adapted to compare each condition information entry with its corresponding acceptance standard and generate a fault indication responsive to each failure of a condition information entry to satisfy the corresponding acceptance standard;

wherein the condition information generator further is adapted to present a condition record including the address information and the condition information for retrieval by a remote monitoring station, in response to receiving a cue from the monitoring station.

39. The computing station of claim 38 wherein:

the detector array includes a plurality of detectors for detecting different conditions, and the condition information includes a plurality of condition information entries individually related to the different conditions.

40. The computing station of claim 39 wherein:

each of the condition records includes condition information entries corresponding to all of the different conditions.



41. The computing station of claim 39 wherein:

the condition information generator is operably coupled with the comparator and thereby is adapted to selectively incorporate in the condition record only the condition information entries that include fault indications.

42. The system of claim 39 wherein:

each of the acceptance standards consists essentially of one of the following: a maximum value, a minimum value, and a range of values.

43. The computing station of claim 38 wherein:

the controller operates independently of the primary processor.

44. The computing station of claim 38 wherein:

the condition information generator comprises a web engine adapted to present the condition record as a web page at the computing station.

45. The computing station of claim 44 wherein:

the web engine comprises a computer program contained in a data storage environment near the controller.

46. A process for monitoring conditions at a plurality of remote computing stations, including:

providing a detector array at each of a plurality of remote computing stations, and using each detector of each array to sense a condition at the associated station;

using a controller at each station to receive a detector signal from each detector of the associated array, and to generate a condition signal corresponding to each detector signal;

generating condition information at each computer station including a condition information entry corresponding to each condition signal;

assembling the condition information at each station, along with address information identifying that station, into a condition record associated with that station;

sending a cuing signal from a monitoring computer to each of the remote computing stations;

responsive to receiving the cuing signal at each remote station, presenting the condition record associated with that station for retrieval by the monitoring computer; and

using the monitoring computer to retrieve the presented condition records.

47. The process of claim 46 further including:

entering a list of the remote computing stations into the monitoring computer, and causing the computer to send the cuing signals in a sequence to the remote computing stations on the list.

48. The process of claim 47 further including:

using a computer program resident in the monitoring computer to cause multiple repetitions of said sequence.

49. The process of claim 48 wherein:

using the computer program includes generating a pair of interlocked instruction sets, each pair being uniquely and independently associated with a different one of the remote computing stations, wherein a first instruction set of each said pair is directed to establishing a connection with the associated remote station to provide the cuing signal to that station, and a second instruction set of each said pair is directed to setting a threshold for establishing the connection, and generating a failure indication if the connection is not established pursuant to the threshold.

50. The process of claim 47 wherein:

entering the list comprises using an operator-controlled input device coupled to the monitoring computer.

51. The process of claim 46 wherein:

each detector array includes a plurality of detectors, whereby the condition information associated with each remote computing station includes a plurality of condition information entries.

52. The process of claim 51 further including:

maintaining a list of acceptance standards associated with each remote computing station, comparing the acceptance standards with the associated condition information entries in a

one-to-one correspondence, and generating a fault indication responsive to each failure of a condition information entry to satisfy the associated acceptance standard.

53. The process of claim 52 wherein:

said comparing the acceptance standards with the associated condition information entries is performed at each of the remote computing stations.

54. The process of claim 52 wherein:

said comparing the acceptance standards with the associated condition information entries is performed at the monitoring computer.

55. The process of claim 52 further including:

generating visible images of the retrieved condition records.

56. The process of claim 55 further including:

selectively generating, with respect to each retrieved condition record, visible images of only the condition information entries that include fault indications.

57. The process of claim 52 further including:

generating a warning at the monitoring computer in response to retrieving a condition information entry that includes a fault indication.

58. The process of claim 46 further including:

generating a fault indication at the monitoring computer in response to a failure to retrieve a condition record from one of the remote computing stations pursuant to a predetermined threshold after sending a cuing signal to said one remote computing station.